# Design and Fabrication of a Two-Cell PEM Fuel Cell Stack

**Trevor Beyeler-NSF-DMR 0097382-Pittsburg State University (Kansas)**

Fuel cells are highly efficient, environmentally-friendly, emission-less sources of energy that are top contenders in the search for energy sources of the future. In essence, fuel cells are energy cells that produce electricity via the reverse electrolysis reaction of hydrogen and oxygen with heat and water as by-products: $\mathbf{2\ H_{2(gas)} + O_{2(gas)} \rightarrow 2\ H_20 + Energy}$

This energy can be harnessed and used to provide power for such applications as electrical utilities, homes, automobiles, and even cell phones. This project focused on the design and fabrication of a Polymer Electrolyte Membrane fuel cell (PEMFC) using lightweight, relatively inexpensive polymeric materials. This Two-Cell Stack PEMFC is capable of producing voltages of up to 1.8V, and is an improvement over the 0.9V, One-Cell Stack produced in summer 2002 by Derek Weber, another REU participant.

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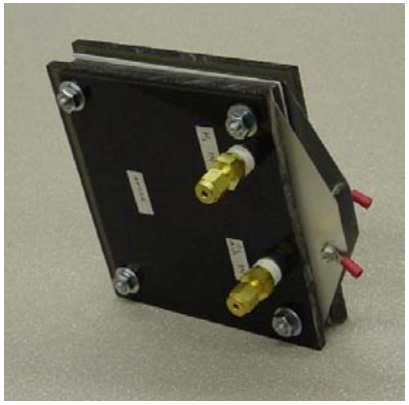
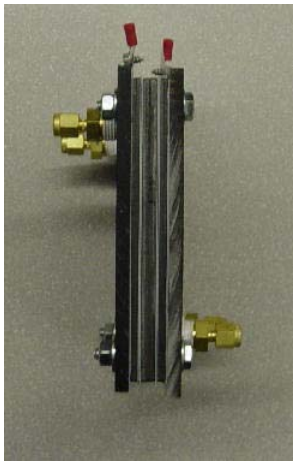


PEM fuel cell designed and assembled as part of the PSU/NSF-REU/RET Summer Research Program.



Side view of the fuel cell stack. This PEMFC system consists of two cells stacked in series. The project is a good example of Academia-Government-Industry Partnership as most of the materials were donated by or procured from industry .

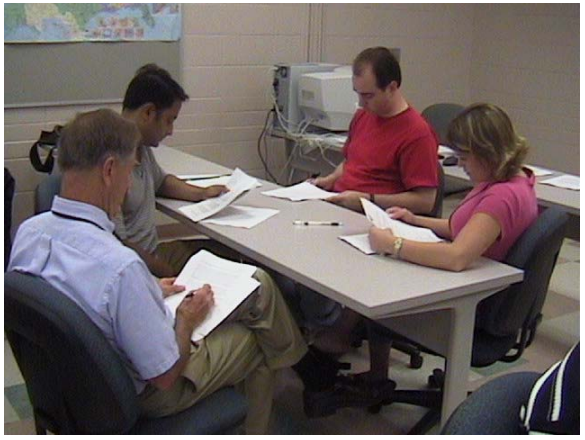
http://www.pittstate.edu/services/nsfreu/

# Education and Ethics Research in the NSF/PSU-REU/RET Program

**NSF-DMR 0097382-Pittsburg State University (Kansas)**

Participants from regional universities and colleges take part in other PSU-REU/RET Summer Research Program activities such as the weekly seminars, lab courses, field trips to partner companies, interactive ethics workshop etc. . The interactive ethics workshops directed by a panel of experts assembled from diverse academic and industrial backgrounds work with and mentor the student and K-12 participants on the role of ethics in society, careers and business strategies.

Participants, Trevor Beyeler ®, Cassandra Stuckey and Ryan Willis engage in interactive discussions of their ethics projects during the 2003 program. Their ethics papers can be viewed via the program's URL: http://www.pittstate.edu/services/nsfreu/



Dr. O. Hensley (L), former dean of graduate studies and research at PSU volunteers his time as mentor and member of the ethics panel. The ethics program emphasizes the need for effective communication and report writing.